

An Experiment is the process of determination that leads to a single outcome that can't be predicted with certainty.

Sample point is the outcome of an experiment

Sample space. Of an experiment is the collection of its all sample points

An event is a specific collection of sample points

Probability of an event = sum of probabilities of its sample point

$$0 \leq P_i \leq 1$$

$$\sum P_i = 1$$

Q.1

$$S = \{1, 2, 3, 4, 5, 6\}$$

$$E_1: \text{even numbers} = \{2, 4, 6\}$$

$$P(E_1) = \frac{n(E_1)}{n(S)} = \frac{3}{6} = \frac{1}{2}$$

Q.2

$$S = \{HH, TH, HT, TT\}$$

$$P(HH) = 1/9 \quad P(TT) = 1/9$$

$$P(TH) = 2/9 \quad P(HT) = 2/9$$

$$A: \text{Exactly one head} = \{TH, HT\}$$

$$P(A) = P(TH) + P(HT) = \frac{4}{9}$$

$$B: \text{at least one head} = \{HH, TH, HT\}$$

$$P(B) = P(HH) + P(TH) + P(HT) = \frac{8}{9}$$

~~Q.3~~

$$A \cap B = \{TH, HT\}$$

$$A \cup B = \{HH, TH, HT\}$$

$$P(A \cap B) = 4/9$$

$$P(A \cup B) = 8/9$$

Q.4

10 coins

A: at least one Head

$$n(S) = 2^{10} = 1024$$

$$P(\bar{A}) = 1/1024$$

$$A^c = \{TTTTTTTTTTTT\}$$

$$P(A^c) = 1/1024$$

$$P(A) = 1 - P(A^c) = 1023/1024$$

Q.5

$$S = \{(\leq 17, W), (\leq 17, B), (18-19, W), (18-19, B), (20-28, W), (20-28, B), (\geq 30, W), (\geq 30, B)\}$$

A: mother is white

$$A = \{(\leq 17, W), (18-19, W), (20-28, W), (\geq 30, W)\}$$

$$P(A) = 0.02 + 0.03 + 0.41 + 0.33 = 79\%$$

B: mother is teenager

$$B = \{(\leq 17, W), (\leq 17, B), (18-19, W), (18-19, B)\}$$

$$P(B) = 0.02 + 0.02 + 0.03 + 0.02 = 0.09\%$$